MEDICINE TODAY

This department of California and Western Medicine presents editorial comment by contributing members on items of medical progress, science and practice, and on topics from recent medical books or journals. An invitation is extended to every member of the California, Nevada and Utah Medical Associations to submit brief editorial discussions suitable for publication in this department. No presentation should be over five hundred words in length.

Proctology. — While hemorrhoids have been treated for more than forty years by submucous injections of sclerosing fluids, other important lesions at or near the anal canal are successfully treated by a similar method. This applies to pruritus ani and anal fissure.

If there is a constitutional or definite local cause of itching it can be discovered and will be suitably dealt with. The so-called idiopathic cases lead to great distress, and the treatment can only be symptomatic. A blocking of the sensory nerve supply by injection will accomplish this. The nerves are the inferior hemorrhoidal and the perineal branch of the fourth sacral, and approach the anus from the posterior and posterolateral aspects. Thus Gabriel,[1] using a solution composed of anesthesin 3 per cent, benzyl alcohol 5 per cent and ether 10 per cent in sterilized oil, injects as much as 10 cubic centimeters through four punctures, 2.5 cubic centimeters being used through each point. The analgesic solution leads to relief within a few hours of injection, and numbness may last some weeks during which secondary changes in the skin may be cared for. He suggests that the anterior area be similarly dealt with, the right anterior and the left anterior quadrants each at a week apart. We have ourselves confirmed the beneficial results of this method, using, however, only one puncture in front or behind the anal canal and about two centimeters from the ano-cutaneous margin. This having been touched with tincture of iodin, a 50-millimeter needle is inserted once only and injections made by altering the position of the point of the needle. The solution must be injected deep enough so that no superficial swelling is noticeable afterward. Yeomans[2] and Goldbacher[3] have described recently similar procedures; the former uses benzocain in alcohol and the latter, phenol in oil.

An uncomplicated fissure, especially one of recent origin, may be cured also by the injection of the solution of anesthesin. By "uncomplicated" one means particularly that the fissure has no sentinel pile likely to prevent drainage of the infected wound, no marked induration of its base, and no sinus connecting it with the deeper tissue. If a sentinel pile is present it may be snipped away cleanly; other complications need operative measures to secure drainage. Five cubic centimeters of anesthesin solution may be injected directly into the sphincter, a finger being inserted into the rectum to prevent puncture of the mucous membrane. This secures the relaxation which is necessary to the healing of all fissures, whatever means are employed. The injection may be made from behind, using the same site as in injecting for pruritus. The needle is inserted into the external sphincter muscle laterally and behind in a fan-shaped manner. Two or three injections may be necessary, but the first will relieve pain and spasm remarkably. It is wise to stimulate the raw area by pure ichthyol, phenol, or silver nitrate.

M. S. Woolf, San Francisco.

1 Gabriel, W. B.: The Treatment of Pruritus Ani and Anal Fissure, B. M. J. (Aug. 30), 1930.

2 Yeomans, C. D.: Proctology, D. Appleton and Co., 1929.

3 Goldbacher, L.: Hemorrhoids, the Injection, Treatment and Pruritus Ani, F. A. Davis, Co., 1930.

Healing of Operative Wounds in Syphilitic Patients.—An idea has long been prevalent that operative wounds in syphilitic patients were very apt to show delayed or faulty healing. Considerable statistical evidence has accumulated during recent years which would seem to prove that such a belief is, in general, incorrect. In a very interesting article, Scheffey [1] has studied wound healing in ninety-two syphilitic patients upon whom major gynecologic operations had been performed. As a control series he studied ninety-two patients with negative Wassermann reactions. Surprisingly little difference was noted in the postoperative course or in the wound-healing rate of the two groups.

When all types of wounds were considered the syphilitic patient's wounds healed as rapidly as did those of the normal controls. The average number of postoperative hospital days showed practically no difference in the two groups. This fact also suggested that convalescence was not prolonged by syphilitic infection as manifested by a positive Wassermann reaction. The study revealed that the amount of treatment which had been given to the treated syphilitic patients prior to operation did not materially hasten wound healing in comparison with the untreated group of syphilitics or with the normal controls. The mortality of the two groups was practically the same.

Scheffey favored routine Wassermann reactions on all gynecologic cases and the consideration of the therapeutic problem of each positive case prior to operation rather than indiscriminate routine preoperative specific therapy on all Wassermann positive cases. He believed that "the coöperation of the syphilologist is desirable, helpful, and advisable."

In discussing this paper, Stokes pointed out that the real problem was that of avoiding the incision of an undiagnosed gumma. For although

1 Scheffey, Lewis C.: The Rôle of the Positive Wassermann Reaction Gynecologic Surgery, J. A. M. A., 96:261, No. 4 (Jan. 24), 1931.

an apparently normal operative wound in a syphilitic patient heals readily, the converse is true when a gumma is incised. Incision causes a gumma to spread rapidly, to "cartwheel" out into the surrounding tissue. Stokes favored a single preoperative arsphenamin injection for the protection of the operative surgeon, but warned that before this is given, one should know that the patient is reasonably young and intact and free from cardiovascular and neural involvement. Otherwise a dangerous Herxheimer reaction might occur.

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Recovery Oxidation in Muscle.*—We are now in position to discuss perhaps the most important of the respiratory mechanisms of the cell. Under the names of myohematin and histohematin MacMunn,[8 9] in 1886, described a respiratory pigment showing characteristic absorption bands in the spectroscope. This pigment occurred in the muscles and other tissues of almost all kinds of animals. Hoppe-Seyler, however, considered the pigment merely a mixture of derivatives of ordinary hemoglobin, and as Keilin puts it, "Malgré les arguments de MacMunn; l'autorité de Hoppe-Seyler a prévalu, et l'existence de ce pigment est rapidement tombée dans l'oubli."[10]

Keilin showed that this pigment does in fact exist, and that it has an importance which MacMunn did not suspect. It occurs in practically all animal cells, and since it is not a simple hematin, Keilin[10] suggested the name "cytochrome" (cell pigment) instead of myohematin. In general the concentration of cytochrome is greater in the more active tissues. Keilin showed by spectroscopic analysis that cytochrome consists of three components, "a," "b," and "c." These substances readily undergo reversible oxidation and reduction without being destroyed.[11 12]

In living cells cytochrome "a," "b" and "c" are readily reduced by hydrogen of the substrate activated by the several dehydrogenases, while the reduced cytochrome is readily oxidized by oxygen in the presence of the enzyme indophenol oxidase (so-called because besides oxidizing cytochrome it will give the indophenol reaction with "Nadi" reagent). Thus "cytochrome acts as a carrier between two kinds of respiratory enzymes of the cell"; dehydrogenases and oxidases. This constitutes a catalytic five compound system, composed of substrate, dehydrogenase, cytochrome, oxidase and oxygen. Here as in all other biological oxidations, the first step in the oxidation is dehydrogenation.

Cytochrome "a" and "c" are only active in catalytic five compound systems, but cytochrome "b" can serve as part of the catalytic four compound system: substrate, dehydrogenase, cytochrome "b," oxygen. Since cyanides do not interfere with the oxidation of cytochrome "b," it is inferred that this substance can transfer hydrogen directly to molecular oxygen, without the aid of oxidase.

For many years Warburg has emphasized the importance of an iron-containing pigment, the "respiratory ferment," in cellular respiration. This material could be inactivated by cyanides, hydrogen sulphide, carbon monoxide and by heating, and Warburg considered respiration to consist essentially of an activation of oxygen by this ferment. However, the recent studies of Keilin,[11] afford much evidence that the "respiratory ferment" is identical with indophenol oxidase, so that we may write the catalytic five compound system mentioned above as: substrate, dehydrogenase, cytochrome, "respiratory ferment," oxygen. Thus it is as an agent in a dehydrogenation that Warburg's "respiratory ferment" is important in biological oxidation, a conception which introduces unity in the various theories of biological oxidation.

Strong evidence in favor of this view is afforded by the fact that methylene blue can replace oxidase plus oxygen.[6]

While the cytochrome system is perhaps the most important of the hydrogen transporters in the animal cell, it is by no means the only one. The sulphydryl compounds (*e. g.*, glutathione, cystine, cysteine) are important in this connection, and Knoop[13] has recently suggested that a similar rôle may be played by a number of reversible oxidation-reduction systems known to be present, such as the oxy and ketonic acids and the ketonic and amino acids.

The opinion was held until recently that the respiration of animal tissues is almost completely inhibited by cyanides. This view was based on a small number of experiments involving a few types of tissues, and the recent work of Dixon and Elliott[14] has shown that in general it is not true. In a series of studies on many tissues from a wide variety of forms these investigators showed that in some cases the maximum inhibition of respiration effected by cyanide is only 40 per cent, while in others (*e. g.*, yeast) there may be up to 90 per cent inhibition. An average of about 60 per cent was noted.

Some examples are interesting. In rabbit muscle M KCN caused a 74 per cent inhibition, in rat M/30 muscle 63 per cent. The writer observed an 83 per cent inhibition in the case of a frog sartorius.

It is clear that cyanide stable respiratory systems are important in the animal economy. In many cases xanthine oxidase may be the chief factor in such respiration, but where there is no

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* Part I of this contribution to this column was printed in the June, 1931, number of California and Western Medicine (page 424).

6 Thundberg, T. Quart. Rev. Biol. v, 318, 1930.

8 MacMunn, C. A. Phil. Trans. Roy. Soc., clxxvii, 267, 1886.

9 MacMunn, C. A. J. of Physiol., viii, 57, 1887.

10 Keilin, D. Reunion Plénière, Société de Biologie, 1927.

11 Keilin, D. Proc. Roy. Soc., B. civ, 206, 1929.

12 Keilin, D. Proc. Roy. Soc., B, civ, 418, 1930.

13 Knoop, F. Science, lxxi, 23, 1930.

14 Dixon, M., and Elliott, K. A. C. Biochem, J., xxiii, 812, 1929.